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Claim Listing

1. (currently amended) A catalyst system comprising an activator and a compound represented by the formula: LMX_2 or the formula $(LMX_2)_2$ wherein:

each M is, independently, a Group 7, 8, 9, 10 or 11 transition metal;

L is, independently, a tridentate or tetradentate neutrally charged ligand that is bonded to M by at least three nitrogen atoms;

at least one of the nitrogen atoms is a central non-pyridinal nitrogen atom and is not bonded to its adjacent atoms by a mulitbond;

at least two of the nitrogen atoms are terminal nitrogen atoms;

at least one terminal nitrogen atom is part of a pyridinyl ring;

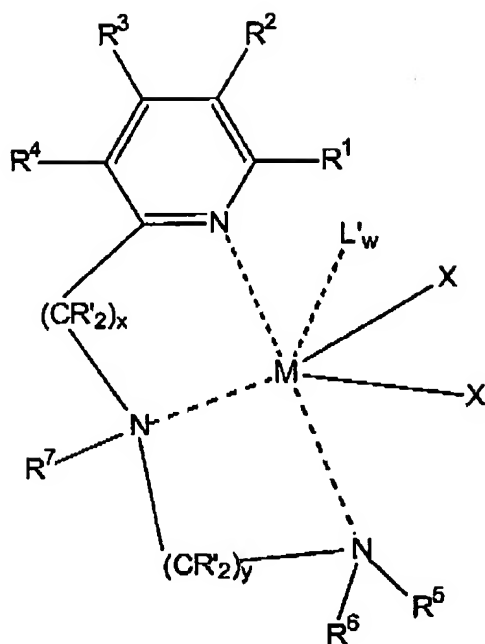
at least one other terminal nitrogen atom is substituted with at least one C_3 - C_{50} hydrocarblyl or halohydrocarblyl;

the central nitrogen atom is bonded to at least two different carbon atoms; and

each X is, independently, an anionic monodentate ligand or two X may join together to form a bidentate dianionic ligand.

2. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:

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wherein:

~~M is a Group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~C is carbon;~~

~~X is, independently, an anionic monodentate ligand, or both X groups together form a bidentate dianionic ligand;~~

R' is, independently, a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring comprising two R' groups on the same carbon, a polycyclic ring comprising two R' groups on the same carbon, a cyclic ring comprising two or more R' groups on adjacent carbons, or a polycyclic ring comprising two or more R' groups on adjacent carbons;

x is 1, 2, 3, or 4;

y is 1, 2, 3, or 4,

R¹, R², R³ ~~or~~ and R⁴ ~~is are~~, independently, a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring structure comprising two adjacent R¹, R², R³ or R⁴, or a polycyclic ring structure comprising two adjacent R¹, R², R³ or R⁴;

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R^5 is a hydrogen, a hydrocarbyl or a halocarbyl;

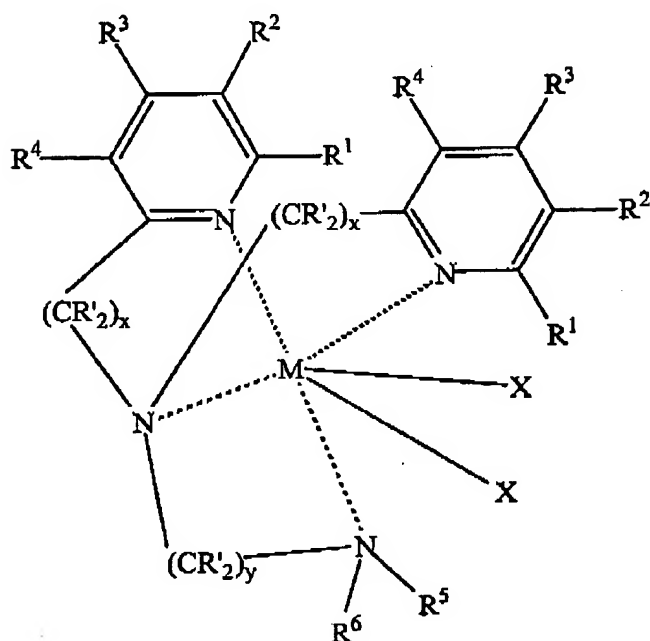
R^6 is a C_3 to C_{50} hydrocarbyl or a C_3 to C_{50} halocarbyl;

R^7 is a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl; a substituted hydrocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M, or a substituted halocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M;

each L' is a neutral ligand bonded to M; and

w is 0 or 1.

3. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:



wherein:

~~M is a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~C is carbon;~~

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~~X is, independently, an anionic monodentate ligand, or both X groups together form a bidentate dianionic ligand;~~

each R' is, independently, a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring comprising two R' groups on the same carbon, a polycyclic ring comprising two R' groups on the same carbon, a cyclic ring comprising two or more R' groups on adjacent carbons, or a polycyclic ring comprising two or more R' groups on adjacent carbons;

x is 1, 2, 3 or 4;

y is 1, 2, 3 or 4;

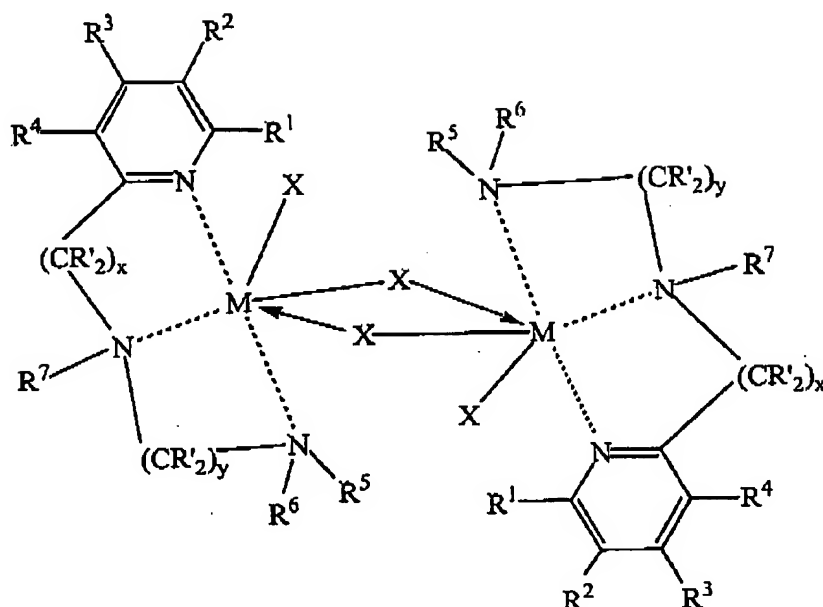
R¹, R², R³ ~~or~~ and R⁴ is are, independently, a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring structure comprising two adjacent R¹, R², R³ or R⁴, or a polycyclic ring structure comprising two adjacent R¹, R², R³ or R⁴;

each R⁵ is a hydrogen, hydrocarbyl or halocarbyl; and

R⁶ is a C₃ to C₅₀ hydrocarbyl or a C₃ to C₅₀ halocarbyl.

4. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:

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wherein:

~~each M is, independently, a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~C is carbon;~~

~~each X is, independently, an anionic monodentate ligand, or two X groups together may form a bidentate dianionic ligand;~~

each R' is, independently, a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring comprising two R' groups on the same carbon, a polycyclic ring comprising two R' groups on the same carbon, a cyclic ring comprising two or more R' groups on adjacent carbons, or a polycyclic ring comprising two or more R' groups on adjacent carbons;

x is, independently, 1, 2, 3 or 4;

y is, independently, 1, 2, 3 or 4;

each R¹, R², R³ ~~or~~ and R⁴ is are, independently, a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring structure comprising two adjacent R¹, R², R³ or R⁴, or a polycyclic ring structure comprising two adjacent R¹, R², R³ or R⁴;

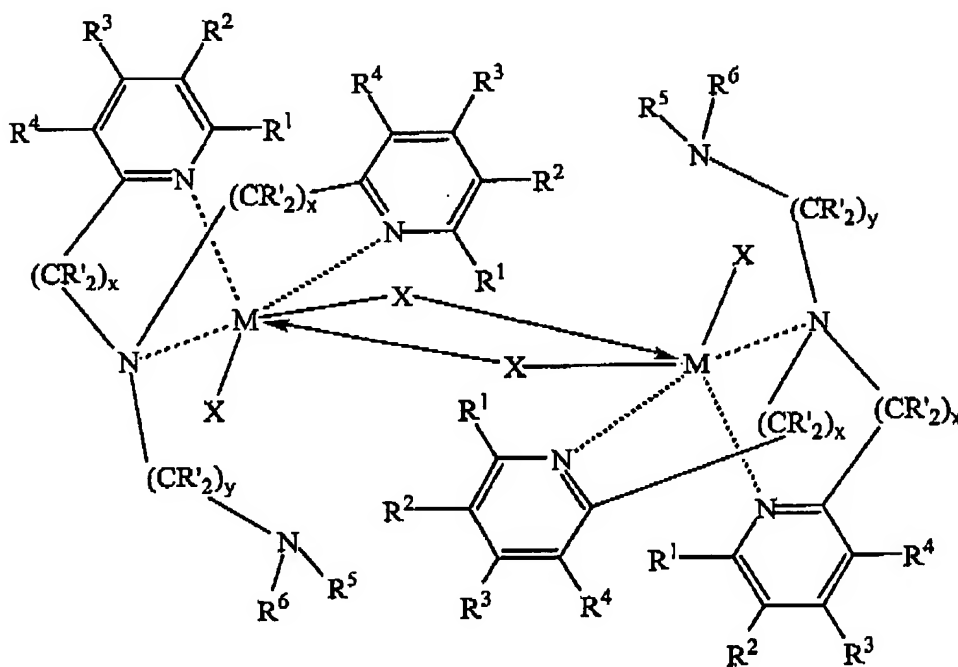
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each R^5 is, independently, a hydrogen, hydrocarbyl or halocarbyl;

R^6 is, independently, a C_3 to C_{50} hydrocarbyl or a C_3 to C_{30} halocarbyl; and

each R^7 is a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl; a substituted hydrocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M, or a substituted halocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M.

5. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:



wherein:

~~each M is, independently, a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~C is carbon;~~

~~each X is, independently, an anionic monodentate ligand, or two X groups together may form a bidentate dianionic ligand;~~

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each R' is, independently, a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring comprising two R' groups on the same carbon, a polycyclic ring comprising two R' groups on the same carbon, a cyclic ring comprising two or more R' groups on adjacent carbons, or a polycyclic ring comprising two or more R' groups on adjacent carbons;

x is 1, 2, 3 or 4;

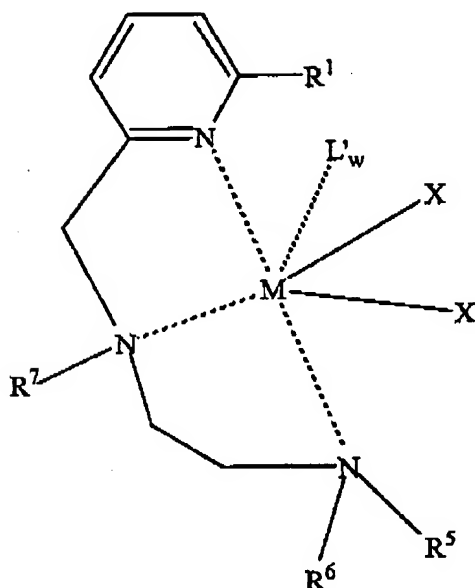
y is 1, 2, 3 or 4;

each R¹, R², R³ or and R⁴ is are, independently, a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, a substituted halocarbyl, a cyclic ring structure comprising two adjacent R¹, R², R³ or R⁴, or a polycyclic ring structure comprising two adjacent R¹, R², R³ or R⁴;

each R⁵ is a hydrogen, hydrocarbyl or halocarbyl; and

each R⁶ is a C₃ to C₅₀ hydrocarbyl or a C₃ to C₅₀ halocarbyl.

6. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:



wherein:

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~~M is a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~each X is, independently, an anionic monodentate ligand, or both X groups together may form a bidentate dianionic ligand;~~

~~R¹ is a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, or a substituted halocarbyl;~~

~~R⁵ is a hydrogen, hydrocarbyl or halocarbyl;~~

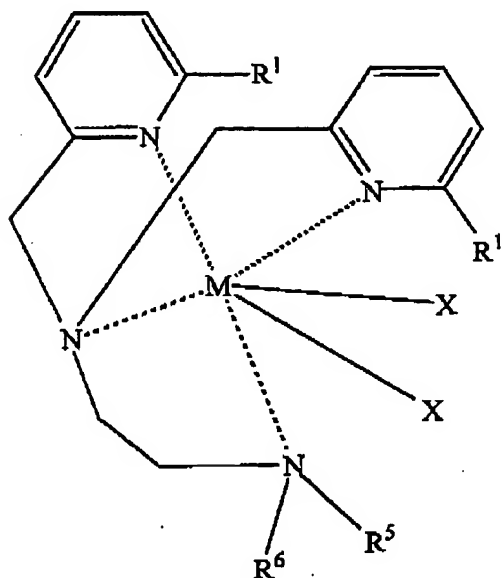
~~R⁶ is a C₃ to C₅₀ hydrocarbyl or a C₃ to C₅₀ halocarbyl;~~

~~R⁷ is a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl; a substituted hydrocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M, or a substituted halocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M;~~

~~L' is a neutral ligand bonded to M; and~~

~~w is 0 or 1.~~

7. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:



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wherein:

~~M is a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

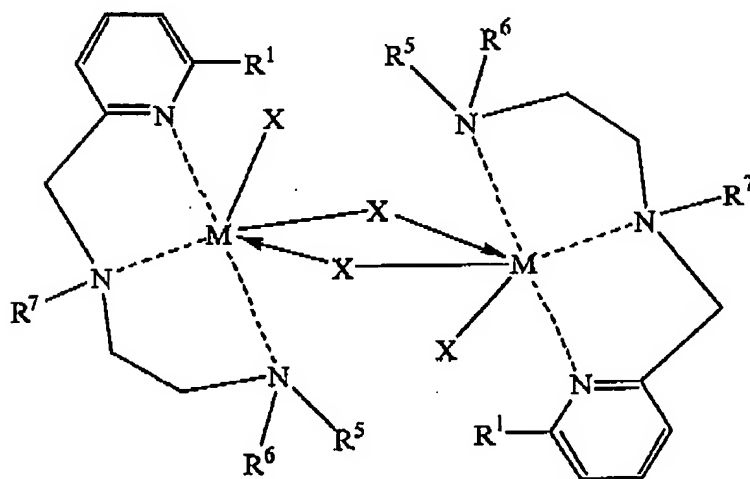
~~each X is, independently, an anionic monodentate ligand, or both X groups together may form a bidentate dianionic ligand;~~

~~each R¹ is, independently, a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, or a substituted halocarbyl;~~

~~R⁵ is a hydrogen, hydrocarbyl or halocarbyl; and~~

~~R⁶ is a C₃ to C₅₀ hydrocarbyl or a C₃ to C₅₀ halocarbyl.~~

8. (currently amended) The catalyst precursor system of claim 1, wherein the compound is represented by the formula:



wherein:

~~M is, independently, a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

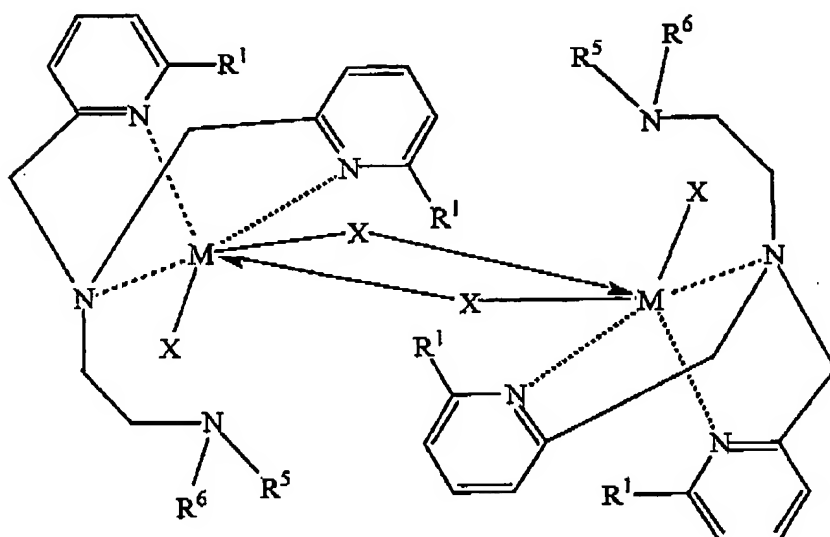
~~X is, independently, an anionic monodentate ligand, or two X groups together may form a bidentate dianionic ligand;~~

~~each R¹ is a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, or a substituted halocarbyl;~~

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each R^5 is, independently, a hydrogen, hydrocarbyl or halocarbyl;
each R^6 is, independently, a C_3 to C_{50} hydrocarbyl or a C_3 to C_{50} halocarbyl; and
each R^7 is a hydrogen, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl; a substituted hydrocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M, or a substituted halocarbyl comprising a heteroatom, wherein the heteroatom is bonded to M.

9. (currently amended) The catalyst system of claim 1, wherein the compound is represented by the formula:



wherein:

~~M is, independently, a group 7, 8, 9, 10, or 11 transition metal;~~

~~N is nitrogen;~~

~~X is, independently, an anionic monodentate ligand, or two X groups together may form a bidentate dianionic ligand;~~

each R^1 is a hydrogen, a hydrocarbyl, a substituted a hydrocarbyl, a halocarbyl, or a substituted halocarbyl;

each R^5 is, independently, a hydrogen, a hydrocarbyl or a halocarbyl;

each R^6 is, independently, a C_3 to C_{50} hydrocarbyl or a C_3 to C_{50} halocarbyl.

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10. (currently amended) The catalyst system of claim 1, wherein M ~~comprises~~ is a group 7, 8, 9, or 10 transition metal.
11. (previously presented) The catalyst system of claim 1, wherein M comprises one or more of nickel, cobalt, iron or manganese.
12. (previously presented) The catalyst system of claim 1, wherein X is a hydride, a hydrocarbyl, a substituted hydrocarbyl, a halocarbyl, a substituted halocarbyl, or wherein two X groups together are a hydrocarbdiyl, a halocarbdyl, a substituted hydrocarbdiyl, or a substituted halocarbdyl.
13. (currently amended) The catalyst system of claim 1, wherein two X groups together are joined, and wherein the two X groups are independently selected from the group consisting of methyldiene, ethyldiene, propyldiene, tetramethylene, pentamethylene, hexamethylene, butadiene, methylbutadiene, dimethylbutadiene, pentadiene, methylpentadiene, dimethylpentadiene, hexadiene, methylhexadiene, and dimethylhexadiene.
14. (cancelled).
15. (previously presented) A catalyst system according to claim 1, wherein the activator comprises an alkyl aluminum compound.
16. (previously presented) A catalyst system according to claim 1, further comprising a support.
17. (original) The catalyst system of claim 16, wherein the support comprises silica.
18. (original) The catalyst system of claim 16, wherein the activator is bound to the support prior to the activator being combined with the catalyst precursor.

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19. (withdrawn) A process to polymerize an unsaturated monomer comprising contacting the unsaturated monomer with the catalyst system of claim 1.
20. (withdrawn) The process of claim 19, wherein the unsaturated monomer comprises ethylene, propylene, a butene, a pentene, a hexene, a heptene, an octene, a nonene, a decene, a dodecene, or a combination thereof.
21. (withdrawn) The process of claim 19, wherein the unsaturated monomer further comprises one or more dienes.
22. (withdrawn) A process to oligomerize an unsaturated monomer comprising contacting the unsaturated monomer with the catalyst system of claim 1.
23. (withdrawn) The process of claim 22, wherein the unsaturated monomer comprises ethylene, propylene, a butene, a pentene, a hexene, a heptene, an octene, a nonene, a decene, a dodecene, or a combination thereof.
24. (withdrawn) The process of claim 22, wherein the unsaturated monomer further comprises one or more dienes.